GAS JOURNAL, AUGUST 21, 1940

VOL. 231 92nd YEAR No. 4031

EDITORIAL NOTES

LIGHTING AND SAFETY

A REPORT on road accidents was issued by the National Safety First Association in 1933. It pointed out how the proportion of accidents occurring at night rose from 17% of the total in 1913 to 29% in 1920, 46% in 1926, and 54% in 1933. This was not due to deterioration of the illumination standard of our roads during this period but to their greater use during hours of darkness. Since then many documents have appeared demonstrating that, though a higher standard of illumination may and probably does lead to the greater use of highways at night and to greater traffic speeds, and to an actual increase in accidents, it leads too to a reduction in the number of accidents for a given traffic flow. That was peacetime. The war brought the blackout. In December of 1939 the number of deaths from road accidents was 1,155—the highest for any month since records were kept. Last December's total included 820 pedestrians, and the overwhelming majority of these were killed during the blackout. Since then "starlight" lighting equipment has been standardized, and we have urged its adoption many times in these columns. It is a dim religious light, but it is exceedingly effective, and the Gas Industry has the proper equipment available. In wartime "starlight" lighting can be a potent factor in the reduction of road accidents by night; it enormously increases the comfort and sense of security of motorist and pedestrian alike.

Regarding broadly this problem of the relationship between artificial illumination and the number of accidents on the road at night we were interested in reading recently in the transactions of the Illuminating Engineering Society of America an article by Mr. M. J. Bankhead discussing light for accident reduction. He was, of course, dealing not with wartime, but with peacetime, lighting and conditions.

An important method of approach to the solution of the traffic-accident problem lies in the manner of recording accidents, and the Author in that article described one type of recording method which appeals to us as being simple and comprehensive and which does demonstrate that inadequacy of illumination is an important cause of traffic accidents. He dealt with some of the findings of the Road Department of the County of Los Angeles, and it is obvious enough that the Department has approached the problem, from the statistical angle, scientifically. At the intersection of two roads in the district covered by the Department, four accidents, resulting in nine injuries and one death, occurred in the first nine months of 1939. They all happened after dark. Increased illumination was installed at this spot—that it was an electric installation does not matter in the least; it could equally well have been gas—and it has proved, at any rate until June of this year, when the Paper was published, a 100% cure.

What the Department does is to take each individual accident case, chart it, and analyze it as far as available information allows. For instance, the available particulars concerning the accidents at one road junction showed that 24 of 25 accidents occurred during darkness; only one occurred during daylight. Darkness provided the clue to the trouble, and again adequate illumination provided the solution. After a period of over 15 months only two accidents occurred. Both occurred during darkness—one when there was a breakdown in the lighting system. The number of accidents at this spot has been reduced by 88%. The lighting cure was applied after the facts were disclosed through the record system. In one area studied the daylight fatalities were 38%, the fatalities during darkness 62%. It is a typical story of the preponderance of night-time fatalities, to which total pedestrian mortality contributes more than its proportionate share. But the article to which we refer does demonstrate that something can be done about it; and we would stress again that, while the conditions it deals with are those of peacetime, we have our permissible wartime lighting and we should apply it. Its application is a duty upon local authorities which they should discharge to the very best of their ability. The Gas Industry is certainly out to help them in this not formidable and not expensive task, but which, fulfilled, means so much to ratepayers and the public in general.

THE PRIORITY ORGANIZATION

THE Tenth Report of the Select Committee on National Expenditure, published on Friday last, deals with the operation of the priority organization, and it offers a good deal of criticism. At the head of the original organization was the Ministerial Priority Committee and below this were six Priority Sub-Committees. Last May the Ministerial Priority Committee was superseded by the Production Council, which, with a slightly altered membership, took over all the functions of its predecessor, and the six sub-committees were reduced to four. Materials and production dominate the picture, and it is to the work of the committee concerned with these matters that the report relates—the working of the priority system in relation to materials and capacity. It is pointed out that the capacity of the producer in the factory may be allotted either wholly to one Department or proportionately to several; his materials are drawn through the machinery devised by the appropriate Controllers, and he is then left to get on with the job. In accordance with these allocations he proceeds with the orders as placed, and any questions of relative urgency are left to the Departments to settle. In bald outline the industrial and manufacturing work of the country was placed in three classes. Class A comprised "war work"—that is, the execution of any work contributory to a service requirement. Class B covered certain other work essential to the national effort, such as the repair and maintenance of plant and machinery. All other work fell into Class C. The object of the Priority Department was to secure that the required output of products was achieved and maintained without avoidable delays.

The merits claimed for this system were its simplicity, the rapidity with which the Priority Committee organization worked, the fact that not only the manufacturer but all his workmen knew from the priority grading marked on each job the relative urgency of the work in hand, and that, since it was related to products and not raw materials, it provided a means of accelerating the production of deficiencies. A general criticism levelled against it was that it flooded the country with such a great number of certificates that these became meaningless, that there were many competing priorities and no satisfactory co-ordination. In more detail the criticisms were that the responsibilities of the Central Priority Department cease after the allocation of materials and capacity have been made; that there is no centralized grading of products; that Departments are often in competition and contractors receive contradictory instructions which they cannot carry out; that the general priority direction does not in any way obviate the need for grading particular products; and that there is no one centralized organization responsible for reviewing and minimizing delays and deficiencies. The Select Committee state: "From what they have heard and seen, they can only conclude that neither the rationing system which places available capacity and materials at the disposal of separate supply departments in accordance with estimated requirements, nor the general priority direction, secures that the output of articles is regulated in terms of the urgency with which they are required to be brought into use. The producer is frequently left to face not merely competition between the different Ministries, but even that between different departments of the

same Ministry, all of whom are pressing that their particular orders should be completed with the least possible delay."

The Committee maintain that an extra-departmental body is needed with powers to compel consuming Departments to modify their specifications or requirements in advance of difficulties; that full inter-departmental co-ordination must be established; that an independent Department comprising the priority organization and the raw material controls should be established, and that this Department must have over-riding powers in the priority field; that a system of priority grading should be established without delay; and that if priority certificates are issued, these should not automatically be carried through to sub-contractors, but independent certificates should be granted to main contractors and sub-contractors. Then, in regard to the progressing organization, it is recommended that departmental Area Progress Officers with local and general production knowledge should be appointed to work as part of the Area Organization; that the whole Area Organization should be expanded and unified on an inter-departmental basis; that Progress Officers with specialized knowledge should be appointed; and that full inter-departmental control must be established. In point of fact the Area Boards have now been reconstituted, the Area Organization of the Ministry of Supply has been reviewed, and Area Progress Officers whose duties would seem to be on the lines recommended by the Committee are now being appointed.

Public Lighting Revenue

It has been shown in the reports relating to the working during the past year of a number of municipal gas undertakings that loss sustained during the war-time suspension of public lighting more than accounts for any small falling off there may have been in total consumption during the year. With the rapid reduction in hours of daylight that is now noticeable, renewed attention may be anticipated to the problem of assisting the wayfarer during the hours of darkness and at the same time enabling gas undertakings to do something towards minimizing public lighting losses. In this connexion, we have been interested in the estimate for the year ending May, 1941, of Mr. R. D. Keillor, Engineer and Manager of the Corporation of Greenock Gas Department, wherein he states that the revenue from public lighting will be £6,500, which is within £900 of the normal figure under this heading. Special stair light masks and the standard "Star light" street lamp masks have been fitted throughout the district, and the lighting season is to commence on Sept. 16 as usual. It is therefore expected that the production of gas at the Inchgreen Works over the current year will top all previous records. During the past financial year gas sales at Greenock (other than public lighting) increased by 1.66%.

Spare Machine Tools

The Minister of Supply, Mr. Herbert Morrison, last week sent to 20,000 firms in all parts of the country a letter containing an urgent appeal that every spare second-hand machine tool should be offered to him for immediate purchase for war production. In his letter Mr. Morrison said: "Machine tools . . . . not fully and usefully employed on war work must be directed to this end at once. We have had a machine-tool census and an Area Supply Boards inspection. This has shown that though the position is improving there is still spare machine-tool capacity, and it must be put to work. The need of the hour calls for the immediate voluntary offering of every available machine.

"The responsibility lies upon the head of a firm to see that no machine that can be spared is retained. . . . Will you not re-examine your present machine tool operations and see whether, by regrouping and replanning you cannot carry out your existing production with a smaller number of tools?"

As we go to press we learn that already nearly 3,000 firms have responded to the appeal.

A Memorable Year at Workington

The present year will be a memorable one in the history of the Borough of Workington Gas Department, inasmuch as one hundred years have now elapsed since the introduction of a gas supply into the town—a Company having been formed in the year 1840 to manufacture and distribute gas for lighting purposes. The fact that for a hundred years the district has enjoyed this inestimable advantage is noteworthy enough, but there is yet more to render the year 1940 a memorable one. In his annual report to the Gas Committee, the Engineer and Manager, Mr. Hedley Hoy, remarks that it is also of particular interest that, after the lapse of a century a change occurs in the policy of the undertaking by the purchase of coke oven gas in bulk; while a further development during the year is the commencement of a district gas supply scheme which may have considerable possibilities in future years. The coke oven gas supply was inaugurated last November, when the Workington Gas Undertaking commenced to take a partial supply from the coke ovens of the Workington Iron and Steel Company. The scheme is now practically complete, and on July 1 this year the manufacture of coal gas ceased. The vertical retorts are being kept under fire for the time being. In connexion with the other matter referred to by Mr. Hoy, it may be mentioned that progress has been made with the installation of the necessary plant in order to supply gas in bulk to the Ennerdale Rural District Council, and it is hoped that this supply will be given in the near future. On April 1 of this year the declared calorific value of the gas supplied by the Workington Undertaking was increased from 430 B.Th.U. to 500 B.Th.U.

Personal

Mr. A. F. COLLISON, Deputy Engineer to the Spalding Gas Department, has been appointed Assistant Works Manager at Wallasey.

Forthcoming Engagements

Aug.

23.—I.G.E.—Benevolent Fund Committee of Management, 2 p.m.

26.—L.C.C.A.—Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 2.30 p.m. [Date changed from Aug. 19.]

Sept.

4.—I.G.E.—Corbet Woodall Scholarship Committee, 2 p.m.

6.—North British Association.—Date provisionally fixed for Annual Meeting at Edinburgh. Papers by Mr. A. B. Munro (Edinburgh) and Mr. J. M. Dow (Kirkcaldy).

10.—I.G.E.—Finance Committee, 2 p.m.; Membership Committee, 2.30 p.m.

17.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2 p.m.

19.—Gas Research Board.—Refractory Materials Joint Committee, 2.30 p.m.

26.—Gas Research Board.—Joint Committee on Complete Gasification under Pressure, 2.30 p.m.

27.—Gas Research Board.—Joint Research Committee, 2 p.m.

27.—I.G.E.—Liquor Effluents and Ammonia Committee, 12.15 p.m.

British Standard Specifications

Carbon Steel Castings for Ships, Marine Engines, and General Engineering Purposes. (No. 592-1940.)

A revised British Standard Specification for Carbon Steel Castings has been published by the British Standards Institution. The new Specification covers Steel Castings for Ships and for Marine Engine and General Engineering Purposes and supersedes B.S. Specifications Nos. 30-107, 592-1935, and 5028-1924. Three grades of castings are included—viz., those having a tensile breaking strength of 28 to 35 tons per sq.in., 35 to 40 tons per sq.in., and a non-test grade—*i.e.*, castings which comply with the Specification excepting that sulphur and phosphorus determinations and tensile and bend test are not required.

Black Bolts—War Emergency Standard. (No. 916.)

To secure the utmost economy in steel consumption the British Standards Institution is co-operating with the Ministry of Supply by revising a number of the existing British Standards, and by preparing new "War Emergency" Standards.

One such War Emergency Standard has recently been issued for Black Bolts and Nuts. This Specification, which is additional to the well-known B.S. 28 for Black Bolts and Nuts of "Whitworth" dimensions, provides for black bolts having heads and nuts smaller than the full Whitworth sizes. The Specification has been prepared at the request of the Ministry and in full consultation with the manufacturers, and it is estimated that the manufacture of bolts and nuts to this new standard will effect a saving of some 60,000 tons of steel per year.

The dimensions of the heads and nuts are those of the next smaller nominal size in the "Whitworth" series, and permit of the use of existing spanners. The dimensions are therefore, in effect, those which have been long recognized for bright B.S.F. bolts and "Auto-Whit" bright bolts as laid down in B.S. 191 and B.S. 193. An interesting feature of this War Emergency Specification for black bolts and nuts is that it makes provision for both the B.S. Whitworth and B.S. Fine thread.

Pressure Creosoting of Timber. (No. 913-1940.)

The Specification covers the methods of pressure creosoting usually employed in this country and gives minimum absorption figures for effective treatment over a wide range of timbers.

Copies of each of these new British Standards may be had from the British Standards Institution, 28, Victoria Street, London, S.W.1; price 2s. 3d. post free.

NEWS OF THE WEEK

Continuing their Experiment with low-intensity lighting, the Leamington Corporation have placed an order with the Leamington Priors Gas Company for a further 100 units to be fixed in selected main and side streets.

Transport Authorities in Lancashire have experimented with the use of coal gas to run emergency buses, especially to relieve congestion during peak periods. Up to date the reports prepared show satisfactory results, and a number of single decker buses are being converted for use with this type of motive power in view of the scarcity of petrol. The experiments at Burnley, Nelson, and Colne are in an advanced state, and after trials with one bus, a number of others are being equipped ready for use in time of emergency.

Civil Defence Authorities are pressing the Government to sanction the use of modified street lighting on Tyneside this winter instead of the complete blackout which operated last winter. The Corporations of Newcastle-on-Tyne and Gateshead are supporting the campaign. It is pointed out that air raids during a complete blackout will be more dangerous than with modified street lighting. It is suggested that as modified lighting is stated to be invisible from the air there is no reason why it cannot be used in all areas.

The Simmance Patent Gravitometer has hitherto given a record of specific gravity of gases relative to air—that is to say, it records a ratio of the weights of equal volumes of gas and air. It has now been modified to give a record in terms of density which can be scaled in any required units such as kilogrammes per cubic meter, pounds per cubic foot, &c. Its application has to a great extent been limited to gas manufacture and distribution problems, but this new development should make its use in many industrial plants of great benefit and utility. Particulars may be obtained from the makers, Messrs. Alexander Wright & Co., Ltd., Westminster, S.W.1.

An Excited Woman rushed into the Luton Gas Company's Showrooms, in the windows of which the Ministry of Information display featuring the Royal Navy was being shown. Pointing to the large photograph of two smiling sailors which formed part of the display, she announced that one of the men was her husband. Curiously enough, it was owing to the display being featured in another gas undertaking's windows—those of the Leicester Gas Department—that the second sailor was identified by *his* wife. At the conclusion of the display each lady was presented with the photograph by the gas undertaking concerned. Many departmental stores and other premises are co-operating in Ministry of Information displays, and hundreds of copies of this particular photo-group were on view up and down the country. That both women recognized their husbands in gas showroom displays suggests the drawing power of gas undertakings' windows.

Scrap Iron and Steel Campaign

Mr. Herbert Morrison, the Minister of Supply, opened a Scrap Iron and Steel Exhibition last Thursday at Charing Cross Underground Station. The object of the Exhibition is to stimulate still further interest in the salvage campaign. Photographs, diagrams, and statistics support the focal point of the display—a modern piece of artillery and a bren gun surrounded by all the bits of old iron and steel which help to make them.

In opening the Exhibition, Mr. Morrison voiced the feelings of everyone in the country in paying tribute to the R.A.F., whose tremendous exploits were being performed under the eyes of the whole world a few miles away from the spot on which they were standing. Their hearts went out in proud admiration to those young men who knew their job so well and who did it with such perfect courage. The 'planes that would be added to the R.A.F. would owe essential parts of their structure to the salvaged materials with which that Exhibition was concerned. The war material that had been won from the scrap and waste of the home, the fields, and the kitchens of Britain was helping to bring down Dorniers and Messerschmitts at that very moment. The Navy's reinforcement, planned and building, would not be possible without the iron and steel scrap so long regarded as junk. The ammunition they were piling up in the mighty barrage against Goering's bombers could not be so efficiently produced without waste paper.

The new salvage drive, launched last month, said Mr. Morrison, had gone off to a flying start. Not every area was yet doing its full share. Not everyone was yet playing his proper part. But large numbers of people and very many local authorities had responded magnificently. So far they had only had in returns for about two-thirds of the local authorities; but already they knew that the July figures were 5,000 tons up on June. At least a quarter of the areas previously below the standard they should have reached attained that standard, or exceeded it, for the first time in July. He believed August would be better still.

On the particular question of scrap, to which this Exhibition is devoted, some facts may be of interest. From salvaged shipwrecks the Ministry of Supply is now getting 1,000 tons of scrap a week. The Ministry's Iron and Steel Control is making a register of old cars suitable for breaking up. In one week 17,000 have been registered. Thousands more will be added—including many now being used as obstructions in the countryside. 13,140 tons of railings have been reported and removed; 10,000 tons of tramlines have been removed—excluding many taken up and used for military purposes. Municipal authorities have scheduled for removal another 30,000 tons. In nine weeks, 3,500 voluntary organizers have been appointed in connexion with the village dumps scheme, and 10,700 tons of scrap have been secured. Instructions have been issued for the clearance of 800 old guns and 21 old tanks.

HOW LONDON FEEDS ITS YOUNGEST SCHOOL CHILDREN

Photographs by courtesy of Radiation Limited.

SCHOOL children, aged from three to fourteen years, are provided with a hot, wholesome mid-day dinner under the admirable system of School Feeding Centres operated by the London County Council. The charge per child may be 4d. or less, but in many cases is given free.

The day at one of these Centres starts at 7 a.m. when a cheerful company of cooks commence to prepare this mid-day meal. Up-to-date gas-heated ovens, vegetable steamers, &c., are loaded with large quantities of food, which is all timed to be ready by 10.30 a.m. The hot, cooked food is then placed in standardized containers, which are transferred to heat-insulated boxes in which it keeps hot for four hours. At 11 o'clock the porters come in, and the loaded food boxes are taken by lorry to the twelve schools in the district covered by this particular Centre. Meanwhile, a grand clean-up takes place, and by 12.30 p.m. dinners are served to the pupils from another twelve schools in the area, who troop into the Centre provided with admission tickets. Hands are washed, Grace said, and then the little ones "tuck in" to the food, which is served by monitors.

This Centre is only one of six inaugurated by the L.C.C., and the kitchens are models of efficiency, planned by experts in catering, and fitted with the latest types of large-scale gas cooking equipment including three roaster ovens, a 2-oven "Chester" range, a stock-pot stand, four double steamers, three 50-gallon "Lune" boilers, two 40-gallon milk and porridge boilers, two "Whitelady" hotclosets, and a 6-ft. gas-heated hotcloset.

The important feature, in present emergency conditions, is that this organization points the way to a large-scale extension of the communal feeding idea. The experience gained will be invaluable in any National scheme of this nature, for group-feeding of the public.

Gas Solves the Problem of

A week or two ago we referred in these columns to the notable progress at the present time in gas central heating for factories and other large buildings. To-day we describe and illustrate an alternative method—namely, overhead radiant heating

INDUSTRIAL SPACE HEATING

IN circumstances where, for some reason or other, there are difficulties involved in the installation of a complete gas central heating system, the overhead gas unit heater provides an excellent alternative or supplementary source of warmth and one which is readily controllable according to the weather conditions and the requirements of the occupants of the building. Moreover, there are certain advantages inherent in direct radiant heating from the comfort standpoint. The present article refers particularly to the "Portcullis" type of heater, though other types of overhead heater, operating on different principles, are available, each embodying certain advantages.

The adequate and economical heating of large buildings is a problem not easy of solution. Factory buildings enclose large volumes of air and there is economy of floor space and fire hazard to be taken into account. In wartime, camps and new factories or extensions are "run up" very quickly and many buildings are used for purposes for which they were not originally planned. The demand for an efficient and reliable form of heating is therefore, if anything, enhanced.

The underground gas main is relatively safe from the effect of aerial bombing, which factor makes for continuity of fuel supply. This, coupled with simplicity of installation at low initial cost, has resulted in an increasing appreciation of the utilty of overhead heaters for new buildings and emergency wartime extensions of existing factories. Among the many factories, camps, &c., equipped since the outbreak of war there is, for instance, one in a country district comprising more than 250 heaters and representing a consumption of approximately 75,000 cu.ft. per day during the winter months.

Radiant Heat for Comfort

Radiant heat and comfort go together. It is for this reason that the open coal or wood fire has for so long remained popular in England giving place now to the open gas fire with radiants in preference to forms of convection heating. The heat from the sun is radiant heat which has travelled through space and which, on contact with the human body warms it—in fact, the sun exemplifies high-temperature overhead radiant heating.

The "Porticullis" gas overhead radiant heater surface temperature is slightly below red heat, and is controlled at will by the turn of a switch or is automatically controlled by thermostat or clock. The heaters, some of which are shown in the accompanying illustrations, are of three alternative shapes—rectangular, wedge, and bowl—each shape being designed to meet certain specific requirements of building construction. By using the appropriate shape or shapes the heat can be equally distributed over the building or thrown directionally in a beam.

Each type consumes the same amount of gas (25 cu.ft. per hour or 500 B.Th.U. gas), and, being flueless, the whole of the heat content of the gas is usefully employed. Nearly 50% is emitted in a downward direction as radiant heat. This radiant heat warms anything on which it falls, for instance the floor and furniture, and, of course, the occupants of the building. The whole principle of heating by radiation from above is bound up with heating the individual without the necessity of warming the air directly to a high temperature as with air heaters or hot pipes. It is necessary to add that the general temperature is raised, but with radiant heating the human body is comfortable at an air temperature about 5° F. lower than the temperature demanded if air heaters were used. This lower air temperature is appreciated by the owners of food stores and shops where perishable goods are handled.

In Great Britain these heaters are widely used industrially, and are becoming increasingly popular. In factories it is found that heating from above is appreciated by the operatives themselves as being pleasant and comfortable. The heaters occupy no floor space, are out of the way, and are not therefore tampered with by the irresponsible. Part only, or the whole, of a building can be heated. Comfort can be obtained quickly; it is only necessary for the heaters to be turned on an hour or so before the building is used. Both installation and running cost are low, as is also the annual maintenance cost.

Apart from the many and varied industrial buildings and public halls where overhead radiant gas heating is in regular use, there are some interesting cases where it has proved to be the only

possible form of heating that could be employed. For instance, in a wood polishing work shop overhead heaters are used to heat the work in severe weather to make the polish flow. There is a skittle alley and several roller skating rinks so heated, and a store where grain must be maintained at the controlled temperature for some days while germinating on the floor.

Installation of Heaters

In a Paper to the Western Junior Gas Association (see "JOURNAL" for July 3), Mr. K. G. Eccleshare, of Bristol, dealt with the subject of overhead radiant heating at some length. In the course of his references to the "Portcullis" types he observed that the installation of the units should present no difficulty provided local conditions are studied before any work is commenced. It is advisable to obtain complete plans of the building, indicating all major structural points such as girders, or any obstructions before deciding which type of heater is to be fitted. From this plan it will be possible to calculate the maximum heat requirements in B.Th.U. per hour for the building, but for the disposition of the heaters an allowance of 200 sq.ft. of floor space per unit can be made. As the wall pattern and wedge heater will serve an area of approximately 16 ft. by 13 ft. and the bowl pattern a 14 ft. by 14 ft. square the final choice will probably be varied, the wall pattern serving the outer areas with wedge or bowls for the centre.

To maintain the heaters in good condition an annual overhaul is necessary, when the whole unit should be dismantled and cleaned. Any broken jets can be replaced, pilots cleaned and governors inspected; after reassembly the pressure should be checked and re-set to give the correct consumption. If this work is carried out properly no more attention should be necessary, although an intermediate inspection is always advisable.

Three Types of Heater

As already stated, the "Portcullis" heater is available in three forms, designed to meet varying conditions. They are fixed to the wall or ceiling, and each heater has an external radiating surface at about 650° F. In consequence, a high percentage of the output is in the form of radiant heat. The rectangular or wall type gives a forward distribution of heat. The overhead bowl gives uniform distribution, while the overhead wedge pattern gives non-symmetrical distribution. Special safety types are available for garages and similar premises where the normal form of overhead heater must not be employed. In these cases all joints are air-tight, and the air inlet and flue outlet are covered with double gauzes of stainless steel to obviate any possibility of corrosion. The lighting orifice is closed with a plug. This unit is constructed to the requirements of the Home Office and the L.C.C.

The general design of the "Portcullis" heater is well known. The rectangular type consists of an outer casing of sheet metal which can be fixed by brackets to the wall. Into this casing is sealed a thick two-piece refractory brick of low heat conductivity. Positioned at the bottom of the brick is a series of Bray industrial jets with gauzes removed, and in front of the burner and brick is a vitreous enamelled iron plate. The overhead bowl heater consists of two concentric steel bowls, the outer vitreous enamelled and the inner heavily nickel plated. The burner—a ring of Bray industrial jets—is placed underneath a circular non-conducting brick housed in the inner bowl. The diameter of the bowls is such that they fit tightly together at the top and are sealed with asbestos rope. This heater can be connected to a flue, in which case it is essential to fit a suitable baffler and terminal. The wedge type is similar in principle, having a series of Bray burners positioned beneath a rectangular non-conducting brick fixed in the base of the inner of two steel wedge-shaped shells.

A governor is supplied as standard with the rectangular wall pattern heater, but it is necessary to fit one separately with the other two types. Generally speaking, each unit has individual control through a Newbridge switch, but on large installations it may be advisable to have a number of heaters under one control, in which case Sugg positive distance switches are used. Thermostatic control can be fitted in either case, utilizing an air thermostat operating through a relay valve in the main gas supply to the units.

Development of this form of heater is proceeding in the laboratory so that on return to peace-time conditions the makers, Bratt Colbran, Ltd., are sure to be in a position to assist the Industry in opening up new fields for the application of overhead radiant heating.

LEICESTER CORPORATION SPECIAL ORDER

A Novel Point Regarding Staffs

A POINT of considerable interest to the staffs of gas undertakings was discussed during an enquiry on Aug. 15 at the offices of the Board of Trade in London, into an application for a Special Order by the Leicester Corporation which seeks to acquire the undertaking of the Narborough, Blaby, Enderby, and Whetstone Gas Light and Coke Company, and to extend the area of supply of the Leicester Corporation Gas Department. The enquiry was held by Mr. R. L. Sich, on behalf of the Director of Gas Administration, and the only opposition came from the National Association of Local Government Officers. The point at issue was whether the Order should contain a clause protecting the officers and staff of the Leicester Corporation during a period of five years from the date of transfer of the Narborough undertaking, against a reduction of emoluments, change of status, or dismissal, as a result of the transfer. The Corporation was represented by Mr. Gerald A. Thesiger, while the National Association of Local Government Officers was represented by Mr. C. J. Jackson, of Messrs. McDonnell, Jackson & Co. (Parliamentary Agents). The promoters of the Order claimed that a precedent would be set up by the passing of this clause.

Mr. THESIGER, for the Leicester Corporation, said that the principal objects of the Draft Order were to acquire the undertaking of the Narborough Gas Company—for which an agreement to purchase had been signed subject to this Order being sanctioned by the Board of Trade—and to extend the area of supply of the Leicester Corporation Gas Department. The only opposition was by the National Association of Local Government Officers who asked that a clause should be inserted in the Order protecting the employees of the Leicester Corporation. This raised an important question of principle inasmuch as it was proposed to protect the officers and servants of the acquiring authority and not the officers and servants of the undertaking to be acquired. Under the agreement between the Corporation and the Narborough Gas Company it was provided that from the date of transfer of the Narborough undertaking, the Leicester Corporation should employ the present Manager and Secretary of the Narborough Company —Mr. E. M. Frost—in the Corporation gas undertaking at a salary of £650 per annum and that he should perform duties with the Corporation as far as possible compatible with the duties he now performed. It was also provided in the agreement that the Corporation should employ all the servants of the Narborough Company who were under the age of 65 years at the date of transfer, and there were approximately 20 people concerned. In this way the Corporation had given the protection to the officers and staff of the acquired undertaking which was usual when one gas authority took over another. The National Association of Local Government Officers, however, asked that a clause should be inserted in the Order providing that the officers and staff of the Leicester Corporation—the acquiring authority—should be protected if they were prejudicially affected by the transfer. Counsel submitted that this created a precedent and contended that if such a precedent were to be made it would be better that it should be by Statute rather than by a Special Order under the Gas Regulation Acts. The proposed clause asked that there should be no dismissal of any of the officers and staff of the Leicester Corporation within five years, or reduction in emoluments or salary or alteration in duties in consequence of the transfer, and the Corporation would be called upon to show that any such effect upon the officers and staff was not due to the transfer.

It was emphasized by Counsel that Section 150 of the Local Government Act of 1933 provided for the protection of the officers and staff of the acquired undertaking but there had never been a case in which the officers and staff of the acquiring authority were given the same protection, the reason being, in his submission, that the latter employees were working under conditions of employment which had been agreed before any such transfer of another undertaking, as was proposed in this case, took place and those conditions of employment were not modified in any way as a consequence of the transfer. The wording of the proposed clause was very much wider than the Act of 1933, upon which it was supposed to be based. If the proposed clause were accepted it would be a decision of widespread importance.

The INSPECTOR enquired whether it might not be possible for servants of the acquiring authority to be given notice in the ordinary way and be replaced by members of the staff of the acquired undertaking.

COUNSEL agreed, but added that whereas in this case only 20 people were being taken over from the acquired undertaking, if the proposed clause were accepted it would mean giving protection to hundreds of people, even if it were limited to the Gas Department in Leicester, but apparently the clause would apply to the whole of the staff of the Leicester Corporation. That would make administration very difficult. Commenting on the possibility of any of the existing members of the staff of the Leicester Corporation Gas Department being displaced by members of the staff of the Narborough Gas Company, Mr. Thesiger said that at the moment the difficulty was to obtain sufficient staff and labour for the Leicester gas undertaking. In the correspondence between the parties concerning this matter the Newcastle-under-Lyme Order had been mentioned as a precedent. In that case protection had been given to the staff of the Newcastle-under-Lyme Corporation Gas Department—which was regarded as the acquiring authority—but the position there was that the Newcastle-under-Lyme Corporation was arranging to take gas in bulk and to discontinue manufacturing gas itself. That was a very different position from the present case.

Engineer's Evidence

Mr. J. Mitchell, Engineer and Manager of the Leicester Corporation Gas Department, said that on June 30, 1940, there were 1,062 employees in the Department. Of these, 164 were salaried staff engaged, in most cases, on the basis of one month's notice and, with the exception of the chief officers, they were all subject to a grading scheme. Of the 1,062 employees, 868 were workmen employees who, worked under agreements with the National Industrial Joint Council for the Gas Industry, and all the findings of that Council were accepted at all times by the Corporation Gas Committee. He confirmed the statement by Counsel that there was a great difficulty at the present time in obtaining sufficient employees for the purposes of the Gas Department, and added that it was proposed to carry on the Narborough gas-works for the time being until mains had been laid from the Leicester works. He anticipated a considerable increase in consumption in gas in Narborough as a result of the transfer for the simple reason that the gas would be cheaper owing to the more modern methods of manufacture adopted by the Corporation.

In reply to Mr. Jackson, for the National Association of Local Government Officers, Mr. Mitchell emphasized that there would

be no displacement of or alteration in status of any of the Corporation Gas Department staff as a consequence of the transfer.

Mr. JACKSON, addressing the Inspector on behalf of the Association, said the position under the proposed clause would be that where an officer or servant of the Leicester Corporation suffered a direct pecuniary loss as a result of this transfer, he should be entitled to make a claim to compensation. Before he would obtain compensation he had to comply with a very stringent set of conditions, which were set out in the fourth Schedule to the Local Government Act of 1933. Only if he succeeded in making a case would he get compensation. He contended that the Local Government Act of 1933 applied to the officers and servants of local authorities who might be affected, as well as to those of an undertaking which was being acquired, and there were also cases in which the same principle had been applied where one local authority had absorbed another local authority.

The INSPECTOR agreed there were numerous precedents for the proposed clause where a local authority was transferring an undertaking but said he was not aware of any precedent for the clause in the circumstances in which it was now asked.

Mr. JACKSON argued that it did not matter, as a question of principle, whether the officers and servants of a local authority suffered pecuniary loss as the result of the authority taking over a gas-works or transferring its gas-works to another authority.

A Point to Be Considered

The INSPECTOR said that assuming the Board of Trade agreed on that point, it seemed to him that it required some justification for asking for the provision in the proposed clause that if any of the Leicester Corporation employees were dismissed, it should be presumed that it was because of this transfer of the Narborough Gas Company unless the Corporation could establish to the contrary. It might be quite right in the case of transfers of areas, but the extension of the application of the principle which Mr. Jackson was now putting forward for the first time was a point which would have to be considered.

Another point was that neither Parliament nor the Board of Trade put in protective clauses unless protection was really required. Mr. Mitchell had stated that so far from there being any danger of any of his existing staff being dismissed, he found difficulty in getting all the labour he now required. While appreciating that that state of affairs might go on for five years—the period named in the proposed clause—it was, nevertheless, a factor.

Mr. JACKSON replied that placing the onus on the local authority had not worked out unfairly to the local authority in practice. Indeed, there were cases within his knowledge in which it had worked out unfairly against the officer. There would have to be an enquiry in each individual case, and although Mr. Mitchell had said there would be no displacement arising out of this transfer, he personally felt it was better to leave the matter at large and not to ask for restrictions on the local authority in this respect.

Continuing, Mr. Jackson said it was no part of the policy of the National Association of Local Government Officers to bolster up a bogus claim, and any claim which was not a good one would receive no assistance from the Association.

Mr. THESIGER, replying to Mr. Jackson, contended that Section 150 (a) of the Local Government Act, 1933, referred only to officers and staff who were to be transferred and not to the officers and staff of the authority acquiring another undertaking. Section 150 (b) dealt with officers who were displaced by virtue of the scheme or Order or of anything done in pursuance of, or in consequence of, its provisions. He submitted that this meant direct displacement, and members of a staff so affected were dealt with by way of compensation at the time of their displacement, when the transfer took place. The Board of Trade should be slow to set a precedent under which people whose terms and conditions were not altered should obtain rights because their authority acquired another undertaking.

The INSPECTOR said he was afraid that had been done in the case of Newcastle-under-Lyme.

Mr. THESIGER pointed out that in that case the Corporation contemplated giving up their works and not extending them by way of acquiring others, as in this case.

The INSPECTOR replied that in the Newcastle-under-Lyme case the Corporation was transferring their works but not their staff.

Mr. THESIGER pointed out that the Newcastle-under-Lyme proposals were not opposed, and that it was a special case, inasmuch as, although the Corporation was transferring its works—in effect—and not its staff, they were taking action which might render some of the staff redundant.

The enquiry then closed and the Board of Trade will report in due course.

Determination of the CAUSES OF PILOT STOPPAGES

Paper presented before Joint Conference of Production and Chemical Committees of the Technical Section of the A.G.A.

By
W. L. SHIVELY
Boston (Mass.) Consolidated Gas Company

UNDER the auspices of the Gas Conditioning Committee in 1938 Dr. A. R. Powell prepared a Paper entitled "A Primer on Gas Deposits in Gas Pipes and Appliances." It has been suggested that amplification or extension of some of the aspects of that Paper might prove of interest or value. This Paper undertakes to supply such amplification, and in that sense it might be termed a "First Reader." It will be confined to consideration of the identification of some types of deposits which cause pilot stoppages.

In order to render modern gas appliances automatic or semi-automatic they have been provided with various controls and one or more pilot flames. The proper functioning and reliability of operation of the appliance is dependent in part upon the ability of the pilot flame to burn continuously at the proper rate. Since pilot flames, in general, consume but a few tenths of a cubic foot of gas per hour the size of the orifice or constriction necessary to reduce the flow to this value is very small. Hence any deposit in the orifice which causes pilot stoppage will be quite minute and inherently more difficult of identification because of this characteristic. This Paper indicates some of the tests and techniques which may be employed.

This subject is of importance in that pilot stoppages are an important, if not a major, factor in modern service difficulties. The actual nature and cause of the pilot deposit must be determined before a proper choice of remedial measures can be made. In many cases the determination of the exact cause of stoppage is the crux of the whole difficulty, for when this is accurately known the remedy may be obvious.

The small size of the deposits on the needle-valve screws that control the flow of gas to the pilots of hotplate and oven burners and automatic water heaters and the like constitutes the principal cause of difficulty in accurately determining their nature. Fulweiller[1], [2] states that, for nitrogenous gum, the quantity involved is of the order of 0.000015 to 0.000135 grammes, and that an average value is 0.000065 grammes. He indicates that the deposit is larger as the time required for its deposition increases. The writer[3] estimated that the quantity of gum involved in stoppage of a Rutz lighter was of the order of 0.0001 gramme. The above values are at least in rough agreement and indicate the necessity of applying the techniques of chemical microscopy or sensitive colorimetric or spot tests, due to the very small size of the sample.

The foregoing data were derived in connexion with work on nitrogenous gum, but are applicable, nevertheless, to other deposits, since we are largely concerned with volume rather than mass when considering the quantity of material required to cause pilot stoppage. For information on the physical dimensions of pilot orifices and the size of particles involved in the formation of deposits the reader is referred to references 2 and 3 and to the excellent Paper by E. J. Brady[4]. In brief, the width of the annular slit formed by a Rutz lighter needle-valve screw adjusted for correct flow on 4.5 in. gas pressure would be approximately 0.00028 in. The size of the particles forming the deposits vary from a molecular dimension to one or two microns, a micron being one thousandth of a millimetre or approximately 0.00004 in.

Sensitivity of Test Methods

In general, the sensitivity of the test methods are adequate. In the case of nitrogenous gum the m-phenylene diamine reagent will show an easily observed yellow colour in the presence of 1 c.c. of an 0.003 grammes per litre sodium nitrite solution. In 1 c.c. of such a solution there is 0.000003 gramme of $NaNO_2$ or 0.00000061 gramme of N_2. If a deposit of nitrogenous gum weighing 0.0001 gramme be considered typically to contain 5% N, we would be dealing with 0.000005 gramme, which is nearly 10 times the quantity involved for the lower limit of sensitivity of our reagent.

If one considers the identification of the constituent radicles of inorganic dusts or deposits which may be found on pilot screws, it is found that there are tests of great sensitivity. Feigl[5] expresses the sensitivities of the methods given in his book by means of two values. One, "the limit of identification," is the smallest weight of substance that can be detected when dissolved in a macrodrop (0.05 c.c.) of solvent. The unit of weight employed is the gamma (γ), which is equal to a millionth of a gramme. The other is the "concentration limit" which is the ratio of one unit weight of the substance to the maximum number of unit weights of solvent in which one unit weight of the substance always gives a positive test.

In the case of iron, for the test with potassium ferrocyanide, the "limit of identification" is given as 0.1 γ—that is, one-tenth of a millionth of a gramme. If one had a deposit on a pilot screw which was largely composed of iron rust he might expect to have about 50% of 0.0001 grammes, or 50 millionths of a gramme of iron. This could easily be got into solution in one drop of a dilute hydrochloric acid solution by the technique described by Chamot

and Mason[6] so that we would then have an amount 500 times the limit of identification.

The following table compiled from data given by Feigl[5] gives the limits of identification for several radicles or elements which might be found as constituents of inorganic dusts or deposits on pilot screws:

TABLE I.

LIMITS OF IDENTIFICATION : CONSTITUENTS OF DUST DEPOSITS.

Constituent.	Limit of Identification (gammas per 0.05 cc. drop).
Fe	0.5
Ferrocyanide	0.5
Sulphide	0.3
Sulphate	0.5
Ca	25
Na	12.5
Mg	0.3
Si	0.1
NH_4	0.7
Sulphur	5
Carbonates	4
Cu	0.5
Al	0.2

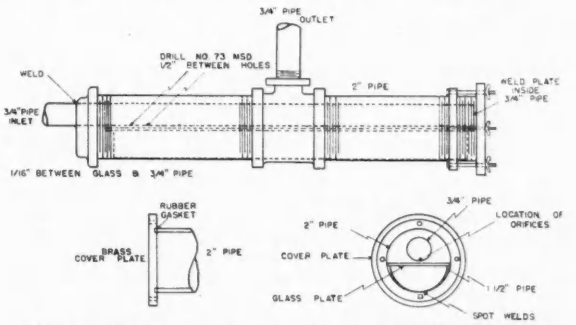
We may therefore conclude from the above that we have for most cases, tests of adequate sensitivity.

It is not intended to discuss detailed methods of identification for all of the substances which may be found on pilot screws. A few tests will be given, the details of which are not generally available or to indicate modification of the usual techniques. In general, reference will be made to texts or other published material where pertinent information may be obtained.

Iron : The presence of this substance as a major constituent of a pilot screw deposit indicates "dust trouble." If the screw tip be examined under a microscope with a magnification of about 50X, a ring of brownish or dark-coloured material may be seen. In some cases this may appear amorphous or resinous. It will be characterized by insolubility in the usual solvents for gum or tar such as acetone, pyridine, or cellosolve (mono ethyl ether of ethylene glycol) and on heating the pilot screw to dull redness the deposit will be little affected save that it may darken in colour.

For further identification wipe the deposit from the tip of the screw with a small piece of a high-grade, acid-washed, quantitative, filter paper. Note appearance of stain or deposit on filter paper under microscope. Dissolve the deposit on the paper with strong hydrochloric acid to which a little nitric acid has been added to convert the iron to the ferric condition. In the case of the usual dust encountered in manufactured gas distribution systems, there will be complete solution of the stain and the paper will be colourless or a faint yellow. To that portion of the paper containing the dissolved deposit apply a little powdered anhydrous potassium ferrocyanide and, if necessary, moisten with a small drop of distilled water. The presence of iron is indicated by a deep blue colouration of ferric ferrocyanide. It is advisable to run a blank to see that the filter paper used is free from iron salts. Qualitative papers will often give a blue colouration in the blank test.

Nitrogenous Gum : Examined under a microscope at about 50X magnification the deposit will be found to be relatively soluble in pyridine, acetone, alcoholic KOH, or cellosolve but little affected by benzol. A brown colour and resinous physical characteristics may or may not characterize a nitrogenous gum deposit, for the gum when newly deposited may be even white[7], and when old may be similar in appearance to dust. The usual test recommended in the literature as a modification of the Wenzel test wherein a piece of filter paper moistened with Griess reagent is substituted for the starch-iodide paper recommended by Wenzel[8]. Too often, however, this test has been misleading in that the pink colouration observed on the paper moistened with Griess reagent has been due to oxides of nitrogen from the bunsen flame used to heat the sample. It is thought preferable either to use the method in its original form or the following test recommended by Shaw* :



Multiple orifice gas tester at Boston Consolidated Gas Company's Everett laboratory, designed by Public Service of Northern Illinois

Take a small pledget of clean, absorbent cotton, moisten with C.P. acetone, and wipe the deposit from the tips of one or more screws. Place the cotton with its dissolved deposit in a small test tube and add 2 or 3 c.c. of N/2 sodium hydroxide. Place test tube in a water bath and maintain near the boiling temperature for one hour or until all traces of acetone are expelled from the sample. Exactly neutralize with N/2 sulphuric acid and add 10 c.c. of meta phenylene diamine reagent[9]. Set aside for 20 minutes for development of colour. Turn a blank test in parallel as a check on the presence of nitrides in the reagents used. Filter solution after addition of the reagent (being also sure to filter blank) through a small nitrite-free filter paper if necessary to eliminate turbidity. The appearance of a yellow colouration similar to that produced by sodium nitrite indicates the presence of nitrogenous gum in the deposit.

This test has been found sensitive and reliable in practice and has the advantage that the deposits from a number of screws may be combined for test when so desired.

Ammonium Salts : These compounds may be found in the deposits on pilot screws, especially where appreciable quantities of ammonia have got past the oxide boxes. Cases have been known where such ammonia has reacted with the CO_2 in the gas in the distribution system to form ammonium carbonate which has been deposited on pilot screws and other places where the gas was subjected to throttling or abrupt change of direction.

Feigl[5] gives four tests for ammonium varying in sensitivity between 0.672 and 0.0052 gramme which should be adequate to establish the identity of such deposits.

Cyanogen-Organic Sulphur Corrosion : This relatively new type of stoppage is described in a Paper by Murphy and Bayer[10] and is due to corrosion of the screws by the combined effect of cyanogen, organic sulphur, and moisture catalyzed by ammonia. The effect is very much more marked on brass screws than on those of steel. The Authors of the above Paper do not indicate any specific test for this type of deposit of sufficient sensitivity definitely to identify the material on a single pilot screw, but established its nature by an analysis of the combined deposits from a large number of pilot screws.

However, this type of stoppage possesses a number of unique properties which should serve as a basis for fairly definite identification. First, few, if any, steel screws would show this deposit, but it would be confined very largely, if not entirely, to brass screws. Secondly, most deposits such as gum, dust, tar, &c., can be removed by suitable solvents or wiping with filter paper, revealing the original surface of the screw intact. The cyanogen-organic sulphur stoppage is, however, a corrosion of the metal of the screw, and its removal would reveal underlying attack of the metal of the screw itself as revealed by examination under the microscope. Thirdly, a positive test for nitrogenous gum might be obtained, but the deposit would not be soluble in the usual gum solvents.

Naphthalene : No sensitive specific test is known for this compound, but it could be identified as a whitish deposit, soluble in benzol, that would disappear from the screws on the application of moderate heat. If a polarizing microscope were available and particles of the deposit were examined between crossed nichol prisms, polarization colours would be noted[6, 11].

Liquid-Phase Gum : No specific test is available for this material. It will be found to be soluble in acetone and cellosolve, but insoluble in alcoholic KOH. Such deposits on pilot screws should be associated with relatively large deposits throughout the system such as on the air side of district governor diaphragms, in customers' meters, and in many drips[12] and would be characteristic when the gas distributed was largely carburetted water gas.

Tar : No specific test is known that would be applicable to the minute quantity that would be found in a needle-valve screw. There is some possibility that the tests for phenol given by Feigl[5] might be useful for this purpose since the limit of identification is rather low, being one gamma (γ). Here again corollary information such as the distribution of such stoppages in a region near the point of manufacture of the gas, plus the presence of appreciable tar contamination of the oxide boxes, would have to be taken as the main criteria.

Lampblack : These deposits would be composed of dark brown or black particles insoluble in hot aqua regia ; yet they would disappear from the screws on prolonged heating at red heat. Additional quantities of the material can usually be found suspended in the gas near the plant by passing the gas through a filter paper in a Steere tar camera. Like tar deposits, the majority of such stoppages are found in relatively close proximity to the manufacturing plant.

Miscellaneous : The above is a discussion of most of the more common materials causing pilot stoppages, but by no means exhausts the list, as will be realized by all who have had more than casual contact with this problem. Typical, and of interest, is an instance when a light, buff-coloured, deposit was found sporadically in the pilots of appliances near a single district governor of a large distribution system. These were finally identified as calcium sulphide. Ground water had seeped into the main through a joint and upon subsequent evaporation and reaction of the dissolved salts with constituents in the gas, had formed calcium sulphide which was picked up by the gas and carried into the pilot orifices.

Interesting also is the report[13] of large numbers of pilot stoppages due to the deposition of solid hydrocarbons from carburetted water gas and considered to originate in incomplete conversion of the enrichment oil into permanent gases. This case would thus

* Private Communication of J. A. Shaw, Koppers Co., Research Division.

apparently be related to the liquid-phase gum problem, although the deposits were white or yellowish-white in colour. The presence of naphthalene was not absolutely precluded judging from the data reported, although the deposits were said to be non-crystalline. They were reported as insoluble in water and inorganic acids, but soluble in benzol.

Special Tests

It will be usually desirable, and often necessary, to run special tests in addition to the examination of the deposits on pilot screws. Especially valuable is the installation of groups of Rutz lighters (usually five on a common manifold) at various points on the distribution system in cases where an epidemic of pilot stoppages exists. The screws controlling the flow of gas to the pilot should be carefully cleaned and the height of the pilot flames set to a common and predetermined standard. A record of their burning time is kept and, on stoppage, the screws are brought in for laboratory examination. There are several advantages gained from the utilization of such special groups of test lighters. First, if the screws are carefully cleaned and the tests started after the onset of the stoppage epidemic the deposits will, in general, consist of the specific material causing the epidemic, while the screws brought in from lighters in general service will contain random deposits upon which is superimposed the specific or current cause of stoppage. Secondly, the lighters being under careful observation will tend to give more definite information as to effect of proximity to plant, response to manufacturing or distribution changes or change in type of gas distributed, &c. Thirdly, when remedial measures are applied these groups of lighters will show whether any beneficial response may be expected probably in advance of data derived from general distribution complaints.

Another special test device that is very useful is the multiple orifice test device shown in the accompanying sketch*. This device consists of a manifold containing a number of small orifices. A strip of glass is supported immediately below the orifices. These elements are enclosed in a larger pipe chamber so that the gas discharging from the orifices may be bled through a common vent line or burned. In operation, the gas from the orifices impinges upon the glass plate at high velocity, and any suspensoid carried by the gas is deposited on the plate immediately opposite the orifice. The advantage of this device is that it will collect a much larger amount of the trouble-making constituent than a Rutz lighter screw and upon a clean, smooth, glass surface where it can be conveniently examined under a microscope and subjected to various delicate chemical tests. Since a number of separate deposits are obtained, one can subject the deposits in succession to various tests and usually arrive at a fair idea of their nature from the results of one run with the device.

A somewhat similiar device, but employing only a single orifice, is described by Hollings and was found quite useful in an investigation of nitrogenous gum.

For the quantitative determination of the amount of suspensoid carried by a gas the use of tarred filter papers in a tar camera is often possible, although, when the particle size is so small as largely to pass through the filter papers, a porous alundum disc must be employed[5].

The information obtained by examination of the deposits on the needle-valve screws is at best only a part of the whole picture of the cause or causes of pilot stoppage, and considerable care and time must also be spent in obtaining pertinent information on the condition of the gas leaving the plant in respect to such factors as its humidity, tar or lampblack content, the content of NO, HCN, NH_3, H_2S, naphthalene, organic sulphur and the like, as well as comparison of the current position with respect to those constituents as compared with recent past history.

Attention should also be given to conditions in the distribution system. As an example, the gas leaving the plant might be free of naphthalene, yet pick-up from oil deposits in the distribution system cause this material to be found in pilot orifices. A dust-like deposit might be found on random pilot screws, yet the gas in the system be of high relative humidity and the drips showing water. In short, while the actual deposits found in the pilot orifices are of major importance in deducing the general cause of stoppage, nevertheless the laboratory indications must accord with the general picture, so that valid conclusions may be drawn.

Summary

Pilot flames are a necessary element of modern automatic gas appliances and maintenance of their continuous and reliable functioning an important responsibility in modern gas distribution. The determination of the cause of pilot failure is rendered difficult by the minute quantity of material required to cause pilot stoppage, the amount usually being a small fraction of a milligramme. Sensitive test methods applicable to such small deposits are available which enable the identification of most types of deposit, and some of these are described in detail. Special tests to secure information in addition to that yielded by laboratory examination of pilot deposits are described. The importance of considering conditions in the manufacturing plant, nature of various impurities carried by the gas, as well as general conditions in the distribution system is stressed as desirable in arriving at a valid conclusion as to the cause of pilot stoppage.

References Cited

[1] Fulweiler, W. H., "The Gum Problem in City Gas." (A.G.A. Proc. 1932, p. 838-851).
[2] Fulweiler, W. H., "The Gum Problem—Recent Developments." (A.G.A. Proc. 1933, p. 829-840).
[3] Shively, W. L., "Gum and Problems Arising From Its Presence in Distributed Gas." (A.G.A. Proc., 1931, p. 765-770).
[4] Brady, E. J., "The Development of a Non-stop Pilot Control." (A.G.A. Proc. 1933, p. 846-862).
[5] Feigl, Fritz, "Spot Tests." Tr. by J. W. Mathews. New York, Nordeman Publishing Co., 1937.
[6] Chamot, E. M., and Mason, C. W., *Handbook of Chemical Microscopy*. 2 Volumes. New York, Wiley, 1937.
[7] Jordan, C. W. et al., "Gum Deposits in Gas Distribution Systems." (*Industrial and Engineering Chemistry* 26 ; 947 et seq. 27 : 1180-90, 1935).
[8] Wenzel, R. N., "Identification of Vapour-phase Gum in Resinous Deposits." 1933. (*Gas Age-Record* 71 : 413-14).
[9] Shaw, J. A., "Determination of Nitric Oxide in Coke-Oven Gas." 1936. (*Industrial and Chemical Engineering* 8 : 162-167).
[10] Murphy, E. J., and Bayer, A. R., "Effect of Cyanogen-Organic Sulphur on the Stoppage Problem." A.G.A. Chemical and Production Conference, mimeographed 1937. See also Murphy, E. J., "Effects of Cyanogen on Manufactured Gas Industry." (In New England Gas Association, *Gas News*, December, 1939). (*Gas Age* v. 84 : 11, p. 23-27).
[11] Bayer, A. R., "Quantitative Analysis of Deposits in Manufactured Gas Distribution Systems." A.G.A. Chemical and Production Conference, 1936.
[12] Powell, A. R., "A Primer on Deposits in Gas Pipes and Appliances." (A.G.A. Proc. 1938, 0. 577-592).
[13] Kowalke, O. L., "Stoppage of Pilot Lights on Gas Appliances." 1940 (*Gas Age* v. 85, No. 8, p. 23-26).

* Private Communication, Public Service Company of Northern Illinois.

Gas Undertakings Results

Brechin

The Annual accounts of the Brechin Gas Company, Ltd., show (including the balance brought forward from the previous year) a sum of £2,501 at credit of Profit and Loss Account. The payment of a dividend on the ordinary shares at the rate of 2s. 6d. per share, and a bonus of 9d., will leave to be carried forward a balance of £673, subject to Directors' remuneration.

Hamilton

A report submitted to a recent meeting of the Hamilton Town Council on the working of the Gas Department during the past financial year showed a balance in hand of £6,771. The balance brought forward from the previous year having been £10,422, there was a deficit on the working of the past twelve months amounting to £3,651. The balance carried to Net Revenue Account was £13,545, which compares with £18,698 in the previous year. The sum of £2,469 has been transferred to the Reserve Fund, which now stands at £8,079.

Montrose

At the annual meeting of the Montrose Gas Company, Ltd., a dividend of 4½% was declared, making 8½% for the year. A proposal that the remuneration of the Directors be increased was withdrawn. It was stated that the price of gas had been increased by 4d. per 1,000 cu.ft.

Northampton

In their report for the year ended June 30 the Directors of the Northampton Gas Light Company state that sales of gas for the twelve months have proved satisfactory. The quantity sold to private consumers was 1,101,126,800 cu.ft., which compares with 1,084,363,100 cu.ft. in the preceding year. After payment of the maximum dividend at the rate of 5% per annum, there will remain a balance of £38,107 to be carried forward. The carry-forward a year ago was £40,322. To meet the increases in the cost of coal, wages, and materials, the price of gas attaching to the quota only was increased by 1½d. per therm to domestic consumers, and to the initial block only for non-domestic consumers—the prices in excess of these quantities remaining unaltered. The Directors deeply regret to record the death last May of Mr. F. Bostock, who had been a Director since 1897, and Chairman of the Company since 1918.

Wellingborough

The Directors of the Wellingborough Gas Light Company, Ltd., in their report for the year ended June 30, state that the condition of affairs is, in their opinion, quite satisfactory. Notwithstanding war conditions and the discontinuance of public lighting, the sale of gas (after making adjustment for the inclusion of Wollaston) shows a decrease of only 3¼%. It may be pointed out that the Wollaston gas undertaking was transferred to the Wellingborough Gas Light Company in July of last year, with the intention that the manufacture of gas at Wollaston should be discontinued on completion of a main from Wellingborough. After payment again of dividends for the year at the rates of 7½% on the original and 6% on the additional shares, there will remain a balance of £6,407 to be carried forward. A year ago the carry forward was £5,546.

(*Further Results will be found on p.* 337)

Products Prices

The London Market

Aug. 19.

There are no changes to record in the values of tar products in the London market, which remain as follows: There is very little export demand for pitch, and the price is quite nominal, creosote is about 4¼d. to 5d. per gallon, refined tar 3¼d. to 4d., the price of pure toluole under the Ministry of Supply Toluene No. 2 Order is 2s. 5d. per gallon, pure benzole 1s. 10d., 95/160 solvent naphtha 1s. 11d. to 2s., and 90/160 pyridine about 18s. 6d., all per gallon naked, refined naphthalene crystals £23 per ton in bags, all *ex* Makers' Works.

The Provinces

Aug. 19.

The average prices of gas-works products during the week were: Pitch and Crude Tar.* Toluole, naked, North, 1s. 9½d. (Controlled by the Ministry of Supply Order No. 1, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North 9d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 4½d. to 1s. 5½d. Creosote, *ex* works, in bulk, North liquid and salty, 4¼d. to 4¾d.; Scotland, 4¼d. to 4¾d.; low gravity, 4¼d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 6d. to 3s. 7½d. Naphthalene, £15 to £20. Salts, 75s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil, (min. gr. 1,080), 5¼d. to 5½d.; filtered heavy oil (min. gr. 1,080), 5¼d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6½d.

*The impossibility of giving a crude tar price, in the absence of any market price for pitch (which comprises 50-60% of a ton of crude tar), has, we understand, raised difficulties in the case of a number of contracts which are based upon the price normally given in the "JOURNAL" from week to week. Our Market Correspondent is not prepared to give a "nominal" price for pitch, upon which a tar price could be based; there was, we believe, trouble in the Courts over such a price at the end of the last War. Our Correspondent suggests that parties might perhaps agree among themselves upon a price to be paid on account, on the understanding that when there is again a market for pitch we should try to fix upon a composite price to cover the period which has intervened, and also give what we think would be a fair price for tar, based upon that figure, for each month of the period during which no prices for crude tar have been inserted. We shall be grateful if interested parties will write to us giving their views upon such an arrangement, so that if there is any consensus of opinion we can act accordingly.

Scotland

GLASGOW, Aug. 17.

New business placed during the week has been on restricted lines. With few exceptions, however, prices are well maintained.

Refined tar.—On the whole deliveries are satisfactory with home price unchanged at 4¼d. to 4½d. per gallon and with supplies available for export at 3½d. per gallon, both f.o.r. naked.

Creosote oil is, if anything, less active although meantime makers' prices are unchanged as follows: Specification oil, 5d. to 5¼d. per gallon; low gravity, 6d. to 6½d. per gallon; neutral oil, 5¾d. to 6d. per gallon; all *ex* Works in bulk.

Cresylic acid.—The demand for this is very poor, even at to-day's low prices as under: Pale, 97/99%, 1s. 11d. to 2s. per gallon; Pale, 99/100%, 2s. 2d. to 2s. 4d. per gallon; Dark, 97/99%, 1s. 7d. to 1s. 9d. per gallon; all *ex* Works in buyers' packages.

Crude naphtha is changing hands in small quantities at 6½d. to 7½d. per gallon *ex* Works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 8½d. to 1s. 9d. per gallon and 90/190 heavy naphtha is 1s. 4½d. to 1s. 5½d. per gallon.

Motor Benzole is 1s. 8d. to 1s. 8½d. per gallon.

Pyridine.—90/160 grade is 17s. to 18s. per gallon and 90/140 grade is 19s. to 20s. per gallon.

Gas Undertakings' Results

Nottingham

In their annual report to the City Council, the Nottingham Corporation Gas Committee state that since the outbreak of war in September last the whole of the energies of the Department have been devoted to the organization of work necessary for the maintenance of adequate gas supplies to the area and for the maximum recovery of essential by-products under existing conditions. Increasing costs made it necessary to raise all gas prices by 5% from January last. The quantity of gas sold during the twelve months ended March 31 was 2,823,112,000 cu.ft., which compares with a total of 2,889,376,300 cu.ft. in the preceding year. At the end of the past twelve months the number of meters in use was 134,650, of which 72.15% were on the prepayment system. A year ago the total was 132,052, with 71.22% prepayment. Taking the past year's figures, the consumption by prepayment consumers is up 1%, while that for public lamps is down 74.35%. Consumption for central heating shows a gain of 19.03%, and that for industrial purposes a gain of 13.73%. Of the amount of gas distributed 21.49% was coke oven gas that had been purchased. The net profit for the year of £27,685 compares with £52,749 a year ago. A sum of £31,500 is again contributed in aid of the rates out of the total at disposal (including the amount brought forward), leaving a balance of £19,415 to be carried forward to next year.

Sowerby Bridge

It is estimated that the loss of consumption for street lighting purposes at Sowerby Bridge during the past financial year amounted to 15,000,000 cu.ft., and without this loss the output of gas would have been higher than during the preceding year. Actually the quantity of gas sent out was 213,803,000 cu.ft.—a decrease of 11,245,000 cu.ft., or 4.9%. Some increase in "unaccounted-for" is attributable to losses from damaged mains during the exceptionally severe winter. In the first two months of the present year over 100 complaints of leakages were investigated at all hours of the day and night under terrible conditions, and 32 mains, ranging from 18 in. to 2 in. diameter, were found broken. During the financial period the total number of consumers increased from 8,043 to 8,130, of whom about one-third are on the prepayment system. Financially, the year's operations have resulted in a net deficit of £1,007, which compares with a net profit of £80 a year ago. To offset increased expenditure, the basic price of gas was increased from 2s. 3d. to 2s. 6d. per 1,000 cu.ft. from the beginning of the January quarter, 1940.

Dividends Announced

Metropolitan of Melbourne

Wm. Coward report cablegram from Principals, the Metropolitan Gas Company of Melbourne, to the effect that net profit for the year ended June 30 is £190,465; Transfer, £10,000; final dividend, 6s. 6d. per share; carry-forward, £79,489.

Croydon

The Directors of the Croydon Gas Company have resolved that dividends for the half-year ended June 30 last be declared and paid on August 31 at the following rates per annum, less tax: On the Preference Stocks, 4%. On the Maximum Dividend Stocks, 5%. On the Sliding-Scale Stocks, 6%.

East Surrey

The Directors of the East Surrey Gas Company have declared dividends for the half-year ended June 30 last at the following rates (actual) less tax: On the Cumulative Preference Stock, 3%. On the Redeemable Preference Stock, 2¼%. On the Preference "A" Stock, 2¾%. On the Ordinary "B" Stock, 2½%.

A.R.P.

PROTECTION OF SANDBAGS.

METRO CREOSOTE EMULSION

METRO COPPER CREOSOTE EMULSION

Both Emulsions conform to the Specification of the Ministry of Home Security Memorandum A.R.P. 279/1939 — 20/10/39, and are available in GREEN at slight additional cost.

SOUTH METROPOLITAN GAS CO.

REGIS HOUSE, KING WILLIAM STREET, E.C.4.

Telephone: AVENUE 2755.

For every size of works and every class of coal...

WEST'S

CARBONIZING PLANTS

GLOVER-WEST VERTICALS

WESTVERTICAL CHAMBERS

440 carbonizing plants have been built or are under construction by West's in 24 countries. Working results from a wide variety of gas coals have established the high efficiency and adaptability of the West systems.

WEST'S

GAS IMPROVEMENT CO · LTD ·

MILES PLATTING MANCHESTER 10

TELEPHONE—COLLYHURST 2961-2-3-4-5 · TELEGRAMS—STOKER, MANCHESTER

LONDON OFFICE TEMPORARY ADDRESS—BATH ROAD · HARMONDSWORTH · WEST DRAYTON · MIDDLESEX TEL.—WEST DRAYTON 2288-9

GAS STOCKS AND SHARES

Business on the Stock Exchange was still limited in volume last week, but the success attending our defences against the enemy's air attacks led to firmness of prices in most sections. Gilt-edged stocks continued to be well supported and quotations closed fractionally higher—2½% Consols being 73¼ against 73 a week ago. A little more interest was displayed in home rails on account of the latest demand for higher fares and rates. A few leading industrials recorded small gains and several bright features were noticeable in the Kaffir market, but little interest was taken in oil and rubber shares.

There was rather more business in the Gas Market than in the previous week and although several stocks lost rather heavily the general tone of the market was firm. This is evidenced by the further improvement in Gas Light units with a rise of 6d. to 14s. 6d., and in Newcastle units which closed 9d. higher at 15s. 9d. at which price business was recorded on the local Exchange. Among the heaviest depreciations were Brighton 5% with a drop of 10 points to 75 and East Surrey which closed 13 down at 82½. In the Supplementary List, apart from *ex* div. reductions, it will be seen that Eastbourne " B " and Tunbridge Wells lost a few points each.

The Directors of the Croydon Gas Company have declared an interim dividend of 3% on the sliding scale stock of the Company, this compares with 3½% for the corresponding period of 1939. The interim dividend of the Sheffield Gas Company is maintained at 3¼%.

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Pref. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug. 16.	Rise or Fall on Week.
1,767,439	Mar. 11	8	7	Alliance & Dublin Ord. ...	90—100	...
374,000	July 1	4	4	Do. 4 p.c. Deb. ...	90—95	...
957,608	May 13	5	5	Assocd. Gas & Water U'd'cts Ord.	12/—14/	.
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	15/6—17/6	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6	...
336,646	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	12/—14/—	..
561,370	Aug. 12	7	7	Barnet Ord. 7 p.c.	111—116*	−2
300,000	Apl. 8	1/4½	1/9⅞	Bombay, Ltd.	19/6—21/6	...
690,407	Feb. 26	7	7	Bournemouth 7 p.c. max ...	110—120	−2½
362,025	June 17	4	4	Do. 4 p.c. Deb. ...	90—95	...
659,955	Feb. 19	7½	6¾	Brighton, &c., 5 p.c. Con. ...	70—80	−10
855,000	Mar. 11	7	8	Brit. Gas Light Ord.	77—87	−5
545,000	June 17	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb.	75—80	...
10,000	Nov. 6, '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	½—¾	...
626,860	July 15	5⅞	6	Cardiff Con. Ord.	89—94	...
24,500	Apl. 8	7	7	Colombo Ord. 7 p.c. Pref. ...	19/6—21/6	...
764,169	Mar. 26	−/11.48	−/11.48	Colonial Gas Assn. Ltd. Ord. ...	14/6—16/6	...
400,000	,,	1/3.30	1/3.30	Do. 8 p.c. Pref. ...	20/—22/—	...
1,748,935	July 22	2	3	Commercial Ord.	37—42	...
620,000	June 10	3	3	Do. 3 p.c. Deb.	58—63	...
286,344	Feb. 19	5	5	Do. 5 p.c. Deb.	88—93	...
807,560	Aug. 12	7	6	Croydon sliding scale	87—92*	−1
644,590	,,	5	5	Do. max. div.	80—85*	−2
620,385	July 1	5	5	Do. 5 p.c. Perp. Deb. ...	90—95	...
179,500	Feb. 12	5⅜	5⅜	East Surrey 'B,' 5 p.c.	80—85	−13
176,461	June 17	5	5	Do. 5 p.c. Deb. (Irred.)...	90—95	...
250,000	July 8	4	6	Gas Consolidation Ord. 'B' ...	13/—15/—	...
250,000	May 13	4	4	Do. 4 p.c. Red. Cum. Pref.	15/—17/—	...
19,152410	July 29	3½	4½	Gas Light & Coke Ord. ...	14/—15/—*a*	+/—6
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	54—59	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	73—78	−2
2,993,000	July 8	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	78—83	...
8,602,497	June 3	3	3	Do. 3 p.c. Con. Deb. ...	65—70	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	99—104	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	98—103	+1
700,000	Mar. 11	3½	3½	Do. 3½ Red. Deb. ...	80—85	...
5,600,000	May 13	4	8	Imperial Continental Cap. ...	32—37	−½
43,820	July 29	3½	3½	Do. 3½ p.c. Red. Deb. ...	63—68	...
231,978	Feb. 19	5	5	M.S. Utility 'C' Cons.	70—75	...
918,657	,,	4	4	4 p.c. Cons. Pref.	75—80	...
675,000	May 6	†4	†4	Montevideo, Ltd.	52—57	...
300,000	Apl. 29	9	7	Oriental, Ltd.	100—110	−5½
368,537	June 3	7	8	Plymouth & Stonehouse 5 p.c.	90—100	...
621,667	Feb. 5	8½	8½	Portsmouth & Gosport Cons.	100—105	...
648,999	Apl. 29	1/1½	1/1	Severn Val. Gas Cor. Ld. Ord.	14/—16/—	...
597,972	Mar. 11	−/10⅜	−/10⅜	Do. 4½ p.c. Cum. Pref. ...	16/—18/—	...
2,528,714	April 29	1/2⅜	1/—	South East'n Gas Cn. Ld. Ord.	11/—13/—	...
1,000,000	Mar. 4	−/10⅜	−/10⅜	Do. 4½ p.c. Red. Cum. Pref.	14/—16/—	...
1,068,869	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	13/—15/—	...
6,709,895	Aug. 5	4	4	South Met. Ord.	49—54*	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	98—108	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	70—75	...
1,895,445	July 1	3	3	Do. 3 p.c. Perp. Deb. ...	60—65	...
1,000,000	July 15	5	5	Do. 5 p.c. Red. Deb. ...	95—100	...
1,543,795	July 22	3	4	South Suburban Ord. 5 p.c. ...	60—70	...
512,825	July 8	5	5	Do. 5 p.c. Perp. Pref. ...	88—93	...
500,000	,,	4	4	Do. 4 p.c. Perp. Pref. ...	71—76	...
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	80—85	...
888,587	June 10	5	5	Do. 5 p.c. Perp. Deb. ...	95—100	...
750,541	Feb. 5	5	5½	Southampton Ord.	70—75	...
350,000	Feb. 12	5½	5½	Swansea 5½ p.c. Red. Pref. ...	90—95*	−2
1,076,495	Aug. 5	5	5	Tottenham & District Ord. ...	68—78	...
338,555	,,	5	5	Do. 5 p.c. Pref.	88—93	−2
453,380	June 10	4	4	Do. 4 p.c. Perp. Deb. ...	82—87	...
1,247,505	May 20	4	6	U. Kingdom Gas Cor. Ord. ...	12/—14/—	−/6
1,085,952	May 13	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	14/—16/—	...
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	14/—16/—	...
745,263	June 17	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	12/6—14/6	...
1,200,000	Mar. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	83—88	...
380,606	Aug. 5	7	6½	Uxbridge, &c., 5 p.c.	93—98	...
1,371,138	July 8	3½	4	Wandsworth Consolidated ...	67—72	...
2,525,768	,,	4	4	Do. 4 p.c. Pref.	70—75	...
1,343,964	June 17	5	5	Do. 5 p.c. Deb.	90—95	...
383,745	,,	4	4	Do. 4 p.c. Deb.	80—85	...
558,342	July 15	6	5	Watford & St. Albans Ord. ...	88—93	...
300,000	June 10	3½	3½	Do. 3½ p.c. Red. Deb. ...	85—90	...

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Pref. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Aug. 16.	Rise or Fall on Week.
351,685	June 17	5	5	Brighton, &c., 5 p.c. Perp. Deb.	90—95	...
28,700	,, 17	5½	5½	Do. 5½ p.c. Red. Deb. 1942 ...	96—101	...
415,250	,, 17	4	4	Bristol Gas Co., 4 p.c. New Deb.	85—90	...
140,205	July 29	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	100—110	...
295,932	Mch. 4	5	5	Cheltenham, 5 p.c. Cons. Ord....	90—95	...
42,500	July 1	4	4	Do. 4 p.c. Perp. Deb....	82—87	...
150,000	Aug. 12	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	70—75*	−2
130,000	July 1	4	4	Do. 4 p.c. Deb. ...	75—80	...
146,700	Feb. 12	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	100—110	...
53,223	,, 12	6	6	Do. 6 p.c. Cum. Pref. ...	105—115	...
117,425	,, 5	8	8	East Wight, 5 p.c. Cons. Ord. ...	100—110	...
...	Mar. 4	6	5¾	Eastbourne, 'B' 3½ p.c.... ...	70—80	−5½
239,135	July 8	5	5	Gas Consolidation 'A' Ord. (£1)	13/6—15/6	...
156,600	Feb. 19	5	5	Hampton C't, 5 p.c. Cons. Ord.	75—85	...
18,000	June 10	7	7	Malta & Med'n., 7 p.c. 1st Pref.	60—65	...
10,845	,, 10	7½	7½	Do. 7½ p.c. 2nd Pref.	60—65	...
50,000	Feb. 19	£5 19 6	£5 19 6	Mid. South. Util., 'A' Cons. 5 p.c.	63—73	...
65,000	Aug. 12	5	5	North Middlesex, 5 p.c. Pref. ...	85—90*	−7
70,000	Mar. 11	5	5	Plymouth & Stone., 5 p.c. Deb.	90—95	...
76,501	July 1	4	4	Reading, 4 p.c. Perp. Deb. ...	75—80	...
74,777	April 1	4	4	Romford, 4 p.c. Debs. (Reg.) ...	85—90	...
21,000	June 10	5	5	Slough, 5 p.c. Perp. Deb. ...	90—95	...
211,740	,, 17	5	5	Southampton, 5 p.c. Red. Deb.	96—101	..
363,575	July 1	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	95—100	...
202,019	Mch. 18	7⅛	6⅛	Tunbridge Wells, 4 p.c. Scale ...	70—80	−5
135,257	June 10	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	90—95	...

PROVINCIAL EXCHANGES

347,756	July 26	6	5	Bath Cons.	98—103	..
122,577	Feb. 19	7	7	Blyth 5 p.c. Ord.	109—111	−5½
1,667,250	July 15	5	5	Bristol, 5 p.c. max.	90—92	...
120,420	June 17	4	4	Do. 1st 4 p.c. Deb.	94—96	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb.	92—95	...
328,790	,,	5	5	Do. 5 p.c. Deb.	108—111	...
157,150	Aug. 5	6½	5	Chester 5 p.c. Ord.	98—101	..
92,500	June 17	4	4	Do. 4 p.c. Pref.	80—85	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	80—85	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—98	...
542,270	Feb. 12	6	9	Derby Cons.	103—108	...
55,000	June 10	4	4	Do. 4 p.c. Deb.	96—102	...
10,000	Feb. 19	10	10	Great Grimsby 'A' Ord. ...	170—180	...
6,500	,,	10	10	Do. 'B' Ord. ...	170—180	...
79,000	,,	10	10	Do. 'C' Ord. ...	160—170	...
732,000	Feb. 19	4	4	Hartlepool G. & W. Cn. & New	63—68	...
2,167,410	Feb. 19	6	6	Liverpool 5 p.c. Ord.	98—100	...
245,500	June 17	5	5	Do. 5 p.c. Red. Pref. ...	97½—100½	...
306,083	July 15	4	4	Do. 4 p.c. Deb.	99—101*	...
20,000	June 24	5	5	Long Eaton 5 p.c. Pref.	9—11	...
80,000	June 24	5	5	Do. 5 p.c. Deb.	100—105	...
2,430,267	July 29	5⅞	5	Newcastle and Gateshead Con. '	15 3—16/3*a*	+—/9
682,856	,,	4	4	Do. 4 p.c. Pref.	73—75	...
776,706	Dec. 27	3½	3½	Do. 3½ p.c. Deb.	80—85	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	97—102	...
274,000	July 26	5	5	Newport (Mon.) Ord.	89—93	...
13,200	Mch. 26	7	8½	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½	...
13,600	,,	5	6	Do. 7 p.c. 'B'	9½—10½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	9½—10½	...
106,280	Aug. 5	8	10	Preston 'A' 10 p.c.	157—167	...
188,219	,,	7	7	Do. 'B' 7 p.c.	113—123	...
1,806,339	Feb. 26	6½	6½	Sheffield Cons.	119—122	...
95,000	July 8	4	4	Do. 4 p.c. Deb.	97— 99	...
332,351	Feb. 5	6	6	Sunderland 6 p.c. max. ...	107—112	...
140,778	Feb. 12	5	5	Weston-super-Mare Cons. ...	88—92	..
64,338	June 24	4	4	Do. 4 p.c. Deb.	90—95	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	140—150	...

a.—The quotation is per £1 of Stock. * Ex. div. † Price free of income-tax.

The Air Purification METER

20 Lt. Size
(Illustrated)

Made in sizes from 5 Lts. to 250 Lts.

This is a Wet Meter specially designed for the measurement of air drawn into the gas stream for the revivification of oxide in situ.

A special index shows the hourly rate of measurement by the observation of one minute. The final reading is 100,000 c. ft.

Note air filter on inlet and back pressure valve on outlet.

ALDER & MACKAY LTD.

EDINBURGH : LONDON : BRADFORD : BRANCHES

We Specialise in . .

GAS COALS

THE NEW BOWSON COAL CO.
COLLIERY AGENTS, SHIPPERS and CONTRACTORS
CINDERFORD, Glos.
Telegrams - "BOWSON CINDERFORD"

CASES FOR BINDING
QUARTERLY
VOLUMES OF THE "JOURNAL."
Walter King, Ltd., "Gas Journal" Offices, 11, Bolt Court, Fleet Street, London, E.C.4.

THE INSTITUTE OF CHEMISTRY OF GREAT BRITAIN AND IRELAND.
(Founded 1877) *(Incorporated by Royal Charter 1885)*

APPOINTMENTS REGISTER.

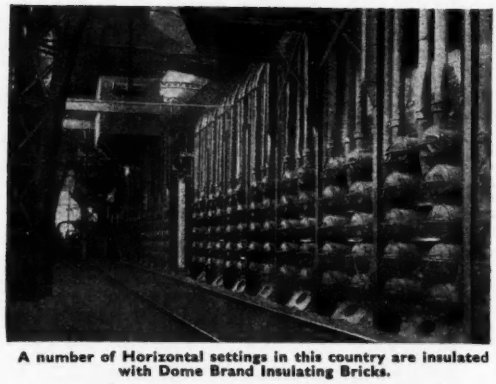
A REGISTER OF CHEMISTS (Fellows, Associates and Senior Registered Students) WHO ARE AVAILABLE FOR APPOINTMENTS, or who are seeking to improve their positions, is kept at the office of the Institute. The facilities afforded by this Register are available (free), to Companies and Firms requiring the services of chemists, and to Universities, Colleges and Technical Schools requiring Teachers of Chemistry and Technology.

Particulars of the Regulations and Examinations of the Institute can be obtained (free), on application to the Registrar.

All communications to be addressed to :—

The Registrar, The Institute of Chemistry,
30, *Russell Square, London, W.C.*1.

The DERBYSHIRE SILICA FIREBRICK Co. LTD.
FRIDEN, HARTINGTON,
Near BUXTON



A number of Horizontal settings in this country are insulated with Dome Brand Insulating Bricks.

Manufacturers of Highest Grade
Silica & Siliceous Refractories
for
Vertical & Horizontal Settings
also
"Dome" Brand Insulating Bricks

Telephone : Hartington 30. Telegrams : Silica, Friden, Hartington

CONTENTS

EDITORIAL NOTES.

A Co-ordination Plan 359
Say it with Flowers 359
Sulphite Dioxide Recovery 359
Nazis Dislike Ramsgate Gas-Works 360
Looking Ahead... 360
Short Cuts 360

Personal 360
Obit 360

Forthcoming Engagements 361
Sulphate of Ammonia Prices 361
Crude Tar Prices 361
Restrictions on Advertising Matter 362
North British Association 362
Behaviour of Silica Bricks 362
Underground Gasification of Coal 362
Use of Pitch as a Fuel. From the Journal of the Institute of Fuel. By Ir. A. Bargeboer ... 365

Heat Radiating Elements 374
Gas Heated Circulators 374
Gas Undertakings' Results 375
British Standard Specifications 375
Pipe-line Corrosion Cau ed by Anaerobic Bacteria. Paper presented at Pennsylvania Gas Association's Annual Convention. By Paul Ganser, Philadelphia Electric Company 371

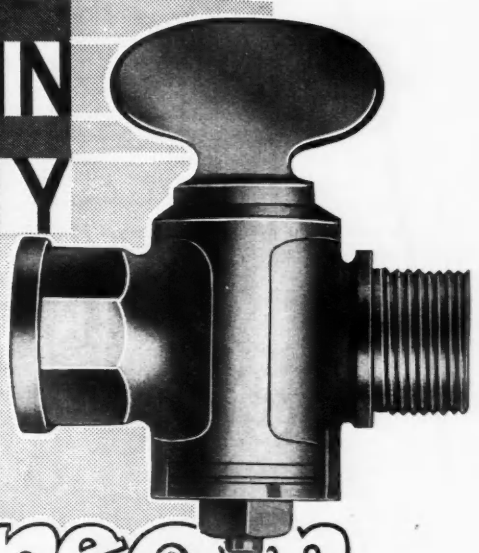
Gas Products Pric es 377
Gas Stocks and Shares 379

TERMS OF SUBSCRIPTION.—*United Kingdom and Ireland: Advance Rate 35/- per annum; 18/- per half year. Credit Rate: 40/- per annum; 21/- per half year. Dominions and Colonies and United States: 35/- per annum, in advance. Other Countries in the Postal Union, 40/- per annum, in advance. A copy of the "G.J." Calendar and Directory is presented to continuous subscribers.*

CLASSIFIED ADVERTISEMENTS.—*Situations Wanted, 6d. a line (minimum 3/-, about 36 words). Situations Vacant, Plant for Sale and Wanted Contracts, Public Notices, Educational, &c., 9d. a line (minimum 4/6). Financial Notices, 1/- per line. Box Number, 6d. extra. WALTER KING, LTD 11, Bolt Court, Fleet Street, London, E.C.4. Telephone: Central 2236-7-8. Telegrams: Gasking, Fleet, London.*

Advertisement Index, see p. 377.

THE FOREMOST GAS COCK IN THE INDUSTRY



THE 'SPERSOM' GAS COCK possesses unique and valuable features of construction.

THE SELF-LUBRICATING FEATURE utilizes the principle of capillary attraction. Consequently oil is fed constantly from a small reservoir in the head of the plug thereby replacing any lost in service.

THE APPLICATION OF THE SPRING LOADING to the plug is carried out in a special manner, which ensures that the plug is always retained on its bearing at a uniform pressure. Dismantling is never necessary.

COCKS FOR ALL PURPOSES can be supplied with these features—Main Service, Gas Fire, Gas Cooker, etc.

Spersom

REGISTERED TRADE MARK

MADE IN ENGLAND BY SPERRYN & CO,. MOORSOM ST. BIRMINGHAM

for

mechanically-lubricated

meters

THOMAS GLOVER & Co. LTD.

EDMONTON, LONDON, N.18 AND BRANCHES

PARKINSON
TEST GASHOLDERS
& APPARATUS FOR
TESTING STATIONS
The perfect apparatus for Meter Testing. Made by Parkinsons of Cottage Lane in accordance with all the requirements of the Board of Trade.
W. PARKINSON & CO.
(Incorporated in Parkinson & Cowan (Gas Meters) Ltd.)
COTTAGE LANE WORKS, CITY RD., LONDON, E.C.1
IRON LANE, STECHFORD, BIRMINGHAM 9.
RAPHAEL ST. WORKS, CROMAC ST., BELFAST.
P2